

# VAPOR CLEANER

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The present invention relates to a cleaner, and more particularly to a vapor cleaner having a reservoir detachably connected to the base of the vapor cleaner so that the operator is able to operate the vapor cleaner easily while moving the vapor cleaner around.

### 2. Description of Related Art

A vapor cleaner is a device having the capability to transform the liquid received in a reservoir to vapor to clean stains or to kill germs on the wall or the like under the condition of adding chemical substance to the liquid. There are normally two types of a conventional vapor cleaner, one is the integral type and the other is the separate type.

The integral type of vapor cleaner has a main frame with a reservoir to receive therein water, a pump received in the main frame to transport the water in the reservoir and a heater to transform the water into vapor. When this type of vapor cleaner is used, the operator turns on the switch to initiate the transportation of the water from the reservoir to pass the heater. The heat from the heater then transforms the water into vapor which is emitted from the nozzle.

The separate type of vapor cleaner has a casing and a nozzle connected to the casing by a telescopic tube. The casing has a reservoir, a pump and a filter. The filter has an inlet connected to the outlet of the reservoir. The pump has an inlet connected to an outlet of the filter and an outlet connected to the telescopic

1 tube. The nozzle has a heater inside and a switch to control operation of the  
2 pump.

3 When the separate type of vapor cleaner is used, the operator fills the  
4 reservoir with water and turns on the heater to initiate heat. Then after the pump  
5 is activated by actuation of the switch, the water is pumped to pass the filter and  
6 the heater such that the water is transformed into vapor and the vapor is able to  
7 clean the stains or germs on the walls.

8 However, the integral type vapor cleaner has a major disadvantage  
9 which when water is received in the reservoir, the entire device becomes heavy.  
10 The operator will have to use a lot of effort to manipulate the device around. If  
11 the disadvantage is to be deleted, the water volume is limited, which reduces the  
12 overall effect of the vapor cleaner.

13 When the separate type vapor cleaner is used, due to the separate design  
14 of the casing and the nozzle, the operator is able to operate the cleaner easily.  
15 However, because the reservoir is mounted inside the casing, the operator will  
16 have to drag the casing to the water source to refill the reservoir. After the overall  
17 weight of the vapor cleaner becomes heavier and heavier due to the addition of  
18 fresh water, the operator may not be able to effortlessly move the vapor cleaner.

19 To overcome the shortcomings, the present invention tends to provide an  
20 improved vapor cleaner to mitigate the aforementioned problems.

## 21 SUMMARY OF THE INVENTION

22 The primary objective of the present preferred embodiment is to provide  
23 an improved vapor cleaner having a reservoir detachably received in the

1 mainframe such that the operator is able to easily refill the reservoir by only  
2 refilling the reservoir without the involvement and movement of other  
3 assemblies of the vapor cleaner.

4 Another objective of the present invention is to provide a locking device  
5 for the detachment of the reservoir to the mainframe so as to secure the  
6 engagement of the reservoir to the mainframe.

7 Other objects, advantages and novel features of the invention will  
8 become more apparent from the following detailed description when taken in  
9 conjunction with the accompanying drawings.

#### 10 BRIEF DESCRIPTION OF THE DRAWINGS

11 Fig. 1 is an exploded perspective view of the vapor cleaner of the present  
12 preferred embodiment;

13 Fig. 2 is a bottom plan view of the reservoir of the preferred  
14 embodiment;

15 Fig. 3 is an exploded side plan view showing the detachment of the  
16 reservoir from the mainframe;

17 Fig. 4 is an enlarged schematic view with partial in cross section to show  
18 the engagement of the locking device to the reservoir;

19 Fig. 5 is a schematic side plan view with partial in cross section to show  
20 the engagement between the nozzle assembly and the mainframe;

21 Fig. 6 is a schematic cross sectional view showing the linking  
22 relationship between the locking device and the nozzle assembly;

23 Fig. 7 is a schematic side plan view showing the detachment of the

1 nozzle assembly to the mainframe;

2 Fig. 8 is a schematic cross sectional view showing the relationship  
3 between the stop and the ventilation hole in the reservoir;

4 Fig. 9 is a schematic cross sectional view showing the stop leaves the  
5 ventilation hole to allow pressure equilibrium inside and outside the reservoir;  
6 and

7 Fig. 10 is a schematic side plan view showing that the control pump has  
8 a heat dissipating plate attached to the outer periphery of the control pump to  
9 facilitate heat dissipation of the control pump.

#### 10 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

11 With reference to Fig. 1, the vapor cleaner in accordance with the  
12 present preferred embodiment has a mainframe (10), a reservoir (20), and a  
13 nozzle assembly (40) in communication with the mainframe (10) by a telescopic  
14 tube (30).

15 The mainframe (10) has a hole (11) defined in a hollow body of the  
16 mainframe (10) and having multiple extension rods (111) formed on a peripheral  
17 side wall defining the hole (11), a recess (13) defined in the hollow body to  
18 receive therein a filter (12) which has an inlet (121) in communication with the  
19 hole (11) and an outlet (122), a control pump (14) sandwiched between the  
20 telescopic tube and the outlet (122) of the filter (12) for pumping water toward  
21 the nozzle assembly (40), a master switch (15) electrically connected to the  
22 control pump (14) to control the actuation of the control pump (14) and a baffle  
23 (18) securely connected to a rear portion of the hollow body by a neck (181) (as

1 shown in Fig. 3).

2 A locking device in accordance with the preferred embodiment includes  
3 a spring-driven hooking member (16) with a hook (161) formed on a front  
4 portion of the hooking member (16) and a press (162) formed on a rear portion  
5 and extending out of the hooking member (16). The hooking member (16) is  
6 received in an indentation (100) defined in the hollow body of the mainframe  
7 (10). Multiple cutouts (17) are defined in a joint between a wall extending  
8 upright from the hollow body and a top face of the hollow body. An engaging  
9 member (19) is formed on the wall and has an engaging hook (191) and a knob  
10 (192) to control the movement of the engaging hook (191). More details  
11 concerning the interaction between the engaging hook (191) and the knob (192)  
12 will be discussed in the follow.

13 With reference to Figs. 2 and 3, the locking device further has an L-  
14 shaped plate (25) formed on a bottom face of the reservoir (20) to correspond to  
15 the hook (161) of the hooking member (16) and engaging plates (26) formed on a  
16 bottom rear side of the reservoir (20) to correspond to the cutouts (17) of the  
17 mainframe (10).

18 It is appreciated that the reservoir (20) is hollow inside so that the  
19 reservoir (20) can be filled with water. Accordingly, the reservoir (20) has an exit  
20 (21) defined in the bottom face of the reservoir (20) to correspond to the hole (11)  
21 of the mainframe (10) and a unidirectional valve (22) mounted inside the exit (21)  
22 to correspond to the extension rods (111) in the hole (11). Besides, due to the  
23 provision of the neck (181) and the baffle (18), the telescopic tube (30) can be

1 mounted around the neck (181) to save space of the vapor cleaner as an entirety.

2 When the reservoir (20) is to be mounted on top of the mainframe (10),  
3 with reference to Fig. 4, the L-shaped plate (25) is inserted beneath the hook (161)  
4 and then the engaging plates (26) are inserted into the corresponding cutouts (17)  
5 so that the reservoir (20) is securely engaged with the mainframe (10).

6 Meanwhile, the extension rods (111) in the hole (11) of the mainframe (10)  
7 activate the unidirectional valve (22) to communicate the hollow body of the  
8 mainframe (10) with the hollow reservoir (20). Thereafter, the water received in  
9 the hollow reservoir (20) is able to flow to the filter (12) and the telescopic tube  
10 (30).

11 Referring to Fig. 1, the nozzle assembly (40) in accordance with the  
12 preferred embodiment has a handle (41) formed on top of the nozzle assembly  
13 (40), a nozzle (42) formed on a front portion of the nozzle assembly (40), a  
14 locking plate (43) formed on a bottom face of the nozzle assembly (40), a heater  
15 (45) received in the nozzle assembly (40) and electrically connected to the  
16 master switch (15) of the mainframe (10), a control switch (46) mounted on the  
17 handle (41) to control the exit of vapor due to the heating effect to the water  
18 flowing through the heater (45) and out of the nozzle (42) and an indicator (47)  
19 formed adjacent to the control switch (46) to indicate status of the heater (45).

20 Furthermore, a casing (24) is provided on top of the reservoir (20) by  
21 screws and has a positioning ledge (241) formed on a centrally defined through  
22 hole (240) in the casing (24).

23 With reference to Figs. 5, 6 and 7, when the nozzle assembly (40) is to be

1 mounted on the mainframe (10) with the casing (24) mounted on top of the  
2 reservoir (20), a positioning device is provided to secure engagement between  
3 the nozzle assembly (40) and the mainframe (10). The positioning device has a  
4 positioning recess (190) defined in a rear portion of the nozzle assembly (40), a  
5 pivot (191) pivotally received in and extending out from a side face of the wall  
6 and having a locking head (1911) formed on a first distal end of the pivot (191),  
7 an extension (1912) formed on a mediate portion of the pivot (191) and a block  
8 (1913) formed on a second distal end of the pivot (191) and a control knob (192)  
9 movably received in the wall of the mainframe (10) to engage with the block  
10 (1913). A first spring (193) is provided between a side wall of the mainframe (10)  
11 and the extension (1912) to provide a recovery force to the pivot (191) and a  
12 second spring (194) is mounted around the control knob (192) to provide a  
13 recovery force to the control knob (192). Therefore, when the nozzle assembly  
14 (40) is to be mounted on top of the mainframe (10), the locking plate (43) formed  
15 on the bottom of the nozzle assembly (40) is inserted under the positioning ledge  
16 (241) and then the locking head (1911) is inserted into the positioning recess  
17 (190) in the rear portion of the nozzle assembly (40) Thus the nozzle assembly  
18 (40) is secured to the mainframe (10). When the nozzle assembly (40) is to be  
19 detached from the mainframe (40), the operator is able to press the control knob  
20 (192). Due to the engagement of the distal end of the control knob (192) to the  
21 block (1913), the downward movement of the control knob (192) is able to  
22 activate the pivotal movement of the pivot (191), which releases the limitation of  
23 the locking heat (1911) to the positioning recess (190) of the nozzle assembly

1 (40). Thereafter the nozzle assembly (40) is free from engagement with the  
2 mainframe (10) and the operator is able to move the nozzle assembly (40) as  
3 desired.

4 Furthermore, when the master switch (15) is activated, the pump (14)  
5 starts pumping water from the reservoir (20) which communicates with the  
6 hollow body of the mainframe (10) to allow water in the reservoir (20) to first  
7 flow through the filter (12). Pollutant in the water is filtered out by the filter (12)  
8 and then the water flows through the telescopic tube (30) and into the heater (45).  
9 Because the heater (45) is already heated after the master switch (15) is on, water  
10 flowing through the heater (45) is transformed into vapor. Therefore, if the  
11 control witch (46) is pressed, the vapor is able to exit from the nozzle (42).

12 Because the nozzle assembly (40) is detachably connected to the  
13 mainframe (10), the operator is able to hold the nozzle assembly (40) easily and  
14 move around as required.

15 Furthermore, because of the detachability of the reservoir (20) from the  
16 mainframe (10), the water refill to the reservoir (20) becomes easy and effortless.

17 With reference to Figs. 8 and 9, it is noted that a controlling element (27)  
18 is inserted in the ventilation hole (23) of the reservoir (20). The controlling  
19 element (27) has a membrane (271) formed outside the ventilation hole (23) and  
20 a sphere (272) received in the ventilation hole (23). Therefore, when the  
21 reservoir (20) is filled with water with the reservoir (20) up side down (due to the  
22 hole being defined in the bottom of the reservoir (20)), the membrane (271)  
23 allows air to flow into the reservoir (20) to reach pressure equilibrium inside and



1 outside the reservoir (20). When the reservoir (20) is filled with water and the  
2 reservoir (20) is stood upright for use, the membrane (271) stops water from  
3 leaking out of the reservoir (20).

4 With reference to Fig. 10, it is noted that the control pump (14) has a heat  
5 dissipating plate (141) mounted around the control pump (14) to facilitate heat  
6 dissipation from the control pump (14) and a metal tube (142) integrally formed  
7 with the heat dissipating plate (141) and mounted around the inlet (121) of the  
8 filter (12) to transmit heat from the control pump (14) to heat the water flowing  
9 through the inlet (121) of the filter (12). Therefore, not only the water is heated,  
10 but also the life span of the control pump (14) is prolonged due to the heat  
11 dissipating plate to dissipate the heat generated by the control pump (14).

12 It is to be understood, however, that even though numerous  
13 characteristics and advantages of the present invention have been set forth in the  
14 foregoing description, together with details of the structure and function of the  
15 invention, the disclosure is illustrative only, and changes may be made in detail,  
16 especially in matters of shape, size, and arrangement of parts within the  
17 principles of the invention to the full extent indicated by the broad general  
18 meaning of the terms in which the appended claims are expressed.